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ABSTRACT

This two-part learning module is designed to assist instructors in writing behavioral course objectives that will provide their students with precise statements of what is expected of them in terms of high-level cognitive learning, that is, learning that involves analysis or judgement. Part I of the module defines behavioral objectives as those which call for specific responses from learners, and discusses the hierarchy of those objectives within the cognitive and affective domains of Bloom's Taxonomy. Part II discusses the application of behavioral objectives and Bloom's Taxonomy to the classroom situation. It also provides examples of written learning objectives at each level of the cognitive domain, i.e., knowledge, comprehension, application, analysis, synthesis, and evaluation. Exercises, suggested activities, and tests are provided throughout the module to reinforce the concepts and their application. (JP)

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WRITING HIGHER LEVEL LEARNING OBJECTIVES:

THE COGNITIVE DOMAIN

Prepared for:

The Media Systems Series in Creative Teaching

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D R A F T

WRITING HIGHER LEVEL LEARNING OBJECTIVES: THE COGNITIVE DOMAIN

(A Self-Study Unit)

I. Introduction

Effective teaching depends upon how clearly the learner understands just what he is supposed to learn and upon how accurately his learning can be measured. Well written behavioral objectives provide the student with a precise statement of what is expected of him, and they serve as guidelines to the teacher as to how to measure student progress toward reaching the goals of the course.

Most of the wealth of current research on specifying behavioral objectives fails to call attention to the more complex intellectual processes that learners are capable of achieving. For some objectives, students are required to do little more than recall or memorize; for others they simply reorder material or combine it with other previously learned information. Less frequently, learners are encouraged to develop higher levels of learning, such as analyzing or judging.

You have probably already packaged at least part of your course and tried the materials out on your students. Your revision data may have provided much of the needed information to determine <u>where</u> improvement was necessary. You might find, however, that additional sources of information will be helpful in determining <u>what</u> remedies to employ. Ideas might come from your accumulated experience in diagnosing learner difficulties and interacting with learners. Chats with other instructors and reviews of the current literature on learning and psychology might also prove beneficial. This packet offers still another

possibility; it explores Bloom's Taxonomy as a source of higher classes of objectives that you may not have considered. We have provided you with two learning tasks, one related to your understanding of the concepts involved and one related to your applying the concepts in your relationships with colleagues and students. You may wish to complete the entire packet as one unit or allow time to digest the concepts section (A) before proceeding to the application section (B). If you break down the module, we suggest you review Part A prior to beginning Part B.

II. Rationale

Learning objectives are important to effective teaching. Teachers should be aware that objectives are most useful when they are stated in behavioral terms and that they can be written on several levels, thus reaching a diversity of students and encouraging the highest possible level of response from each.

PART A: LEARNING THE CONCEPTS

I. Study Questions (Pre-Test)

1. What is a behavioral objective?
2. What is Bloom's Taxonomy?
3. What are the three domains?
4. Why is it desirable that teachers know the levels of the cognitive domain?

II. Key Concepts

affective domain

analysis

application

behavioral objectives

behaviors

cognitive domain

comprehension

evaluation

knowledge

psychomotor domain

synthesis

taxonomy

III. Learning Objectives

Goal: To be able to show understanding of the concepts of behavioral objectives and Bloom's Taxonomy. After completing this unit, the learner will be able to:

1. Write a definition of a behavioral objective and relate the concept orally to a colleague.
2. Write a definition of Bloom's Taxonomy and relate it to the creation of behavioral objectives.
3. Write a descriptive definition of cognitive domain.
4. Define the key concepts listed in this unit.

IV. BEHAVIORAL OBJECTIVES: AN OVERVIEW

Learning objectives are simply written statements telling what a student is expected to learn in a class. Behavioral objectives are learning objectives that tell what a student is supposed to do in a class and how he is supposed to do it. The word "do" is the key to the whole idea. The purpose of behavioral objectives is to avoid the kind of confusion that a student feels when all he is told about his English novel course is that it will make him understand and appreciate the English novel. Understanding and appreciation are not measurable commodities. We can't say that one student has one gram of appreciation and another has four grams. Objectives for courses, then, must be couched in more concrete terms, or behavioral terms. What measurable activity is the student supposed to perform when he finishes a unit, and how is he to perform it? Is he supposed to match the names of ten novelists with their major works on a written test? Write an essay describing Dickens as a social critic? Quote a memorized passage from Oliver Twist? Give a five-minute speech on the life of Jane Austin? A teacher can evaluate what a student understands only be observing what the student says, does, or writes--by his behavior. So behavioral objectives should call for specific responses, or behaviors, from the learner.

EXERCISE 1

Choose the objectives in the following list which are stated behaviorally:

____1. Students will have a better understanding of the electoral college.

____2. Students will be able to classify a list of plants into their proper phyla.

____3. Each student will know the definition of Marxism.

____4. Each student will write an essay in which he discusses three of the characteristics of parliamentary government.

____5. At the end of this unit in Art Appreciation, the student will be able to select from a group of paintings those which are examples of cubism.

____6. Students will be able to label the parts of the human eye on a diagram.

Check your answers with those at the bottom of this page.

ANSWERS TO EXERCISE 1:

Numbers 2, 4, 5 and 6 are stated behaviorally. Note that students will be classifying, writting, selecting, and labeling (measurable behaviors), as opposed to understanding and knowing (nonmeasurable concepts) in numbers 1 and 3.

V. BLOOM'S TAXONOMY: AN INTRODUCTION TO THE COGNITIVE DOMAIN

One way that a teacher can create behavioral objectives that include all levels of learning--from simple to complex--is to use Bloom's Taxonomy as a source of classes of objectives. The taxonomy is a classification, or hierarchy, of educational goals and student behaviors, or as Bloom describes it, "a classification of the goals of our educational system" (p. 1). Bloom also calls it "a classification of intended behaviors" (p. 15). The taxonomy divides objectives into three major classifications:

1. The cognitive domain, which emphasizes recall and application of material.
2. The affective domain, which emphasizes emotion and values.
3. The psychomotor domain, which emphasizes action or motor skill.

Most educational objectives fall within the first two domains, particularly the cognitive. Figure 1 is a chart of the taxonomy showing the levels of the cognitive and affective domains from the simple to the complex.

FIGURE 1

Bloom's Taxonomy of Educational Objectives

Cognitive		Affective	
KNOWLEDGE	- to recall and memorize	RECEIVING	- attending; becomes aware of an idea, process or thing; willing to notice a particular phenomenon
COMPREHENSION	- to translate from one form to another interpret, or extrapolate	RESPONDING	- reacting--at first with compliance, later willingly and with satisfaction
APPLICATION	- to apply or use information in a new situation	VALUING	- accepting worth of a thing, an idea or a behavior; prefers; consistent in responding; developing a commitment
ANALYSIS	- to examine a complex and break it down into its parts		

Figure 1 Continued

SYNTHESIS	- to put together information in a unique or novel way to solve a problem	ORGANIZING	- arranging values; determining interrelationships; adapting behavior to a value system
EVALUATION	- to make a judgement about something in light of given criteria	CHARACTERIZING	- generalizing certain values into controlling tendencies; emphasis on internal consistencies; later total philosophy

Each level is built upon and encompasses all that precedes it. In other words, knowledge, the first level of the cognitive domain, must precede comprehension, the second. The taxonomy can be helpful to teachers developing learning modules because it can serve as a source for ideas and as a kind of touchstone against which to measure objectives. An awareness of the taxonomy may prevent a teacher from aiming all his learning objectives and tests at the simple knowlege level. Instead, he may become more adept at asking for more complex intellectual behaviors--analysis, synthesis, evaluation.

The next section of this module (Part B) will be concerned with actually writing objectives that correspond to each level of the cognitive domain, particularly the higher levels.

VI. LEARNING ACTIVITIES

1. Read and complete the exercises in Behavioral Objectives: An Overview and Bloom's Taxonomy: An Introduction to the Cognitive Domain.
2. Recall orally on a tape recorder the essence of the two sections. Listen to your recording and add other implications your own voice and thoughts provoke.
3. Simplify and expand your thoughts by preparing two three-minute lecturettes for interested colleagues and students--one on behavioral objectives and one on Bloom's Taxonomy--in which you present the concepts in as clear and concise a manner as possible.
4. Become aware of the learning objectives to which you have access--both yours and others'--and notice whether or not they are stated behaviorally and at which level of the taxonomy they belong.
5. Construct for yourself any additional learning activities which you wish to pursue to increase your awareness and knowledge of the material in this packet of interest to you.
6. Take Post Test (Section VII).

VII. POST TEST

1. Define "learning objective."
2. Define "behavioral objective."
3. What is Bloom's Taxonomy?
4. List and define the three domains.

PART B: APPLYING THE CONCEPTS

PART B: APPLYING THE CONCEPTS

I. Study Questions (Pre-Test)

1. What are the six levels of the cognitive domain from lowest to highest?
2. What is the definition of each level?
3. How are the levels interrelated?
4. How can they be used to elicit a variety of levels of intellectual activity from students?

II. Key Concepts

analysis
application
behavioral objectives
behaviors
cognitive domain
comprehension
evaluation
knowledge
synthesis

III. Learning Objectives

Goal: To be able to apply the concepts of behavioral objectives and Bloom's Taxonomy. After completing this unit, the learner will be able to:

1. Write objectives and criterion measures in his discipline which conform to specific levels of Bloom's Taxonomy, particularly the higher levels.

2. Classify objectives according to whether or not they are behaviorally stated and which level of the taxonomy they represent.

IV. COMBINING THE COGNITIVE DOMAIN AND BEHAVIORAL OBJECTIVES

Do you remember that the knowledge level (recognition, recall), the comprehension level (translating from one form to another), and the application level (comparing, contrasting, applying) are the first three levels of the cognitive domain? Objectives relating to the same subject matter may be written at any of these levels, each requiring a different type of response from the student. Read the examples below.

Objective 1. Given two lines of poetry that contain a metaphor previously identified, the learner will circle the metaphor.

Objective 2. Given two lines of poetry that contain a metaphor, the learner will write in prose what the metaphor means.

Objective 3. Given two lines of poetry that contain a metaphor not previously identified, the learner will identify it.

Objective 1 is written at the knowledge level. The learner is simply asked to recall knowledge that has already been given him and to add nothing on his own. Objective 2 is written at the comprehension level. The learner is translating from one form of literary expression, poetry, to another, prose. Objective 3 is an application level objective. It assumes that the learner has mastered the concept of what a metaphor is and will be able to apply that concept to a piece of new material.

To see whether or not you have a basic idea of these three levels, try Exercise 1 below.

EXERCISE 2

Write K (Knowledge), C (Comprehension), or A (Application) to indicate the levels at which these objectives are written.

____1. The learner will apply Aristotle's theory of tragedy to Shakespeare's MacBeth.

____2. The learner will identify the parts of a flower.

____3. The learner will identify the discoverer of radium and write an essay to discuss the meaning of the discovery in terms of modern medicine.

____4. Given a list of principles, the learner will check (to recognize) those of Facism.

____5. Given a verbal geometric description, the learner will make a paper model.

ANSWERS TO EXERCISE 2:

The intended responses are: A, K, A, K, C. Let's look again at numbers 2, 3 and 5. In number 2 the learner simply identifies; in number 3 he goes beyond identification to discuss meaning. In 5 he is translating from one medium to another, from verbal description to visual form and he is interpreting written instructions. Objective 3 is the higher intellectual process.

EXERCISE 3

From your own materials, write one of your objectives at the knowledge level in the space below.

Now rewrite your objective at the application level here.

Check to indicate whether your last objective includes not only knowledge of a concept but the ability to apply that concept to a new situation.

Now let's consider the three highest levels of the cognitive domain:

Analysis: breaking down a complex concept into its parts.

Synthesis: putting information together in a new way to solve a problem.

Evaluation: making a judgement based on given criteria.

These levels of the taxonomy require more complex intellectual activity from a student. Rather than simply recalling information or applying a specific piece of information to a new situation, a learner must contribute originality and use what he has learned in a creative manner. Because these levels are more complex, we will look at each one closely.

Analysis

Analysis involves seeing the relationship between a whole and its parts. For example, an objective in a logic course may ask the student to find the fallacies in a piece of propaganda, or to find the major premise, the minor premise, and the conclusion of a syllogism. An objective in a history course may ask the student to determine the important elements in an historical event. In a literature course, the relationship between a theme (A man must make a choice.) and the meaning of an entire work ("The Guest") may be discussed. Here are three specific objectives:

1. After reading a three-paragraph essay, the student will underline the thesis statement and each topic sentence and tell how each supports the meaning of the essay.
2. After reading "To His Coy Mistress," the student will be able to identify three major structural devices used in the poem (form, patterns of imagery, rhetorical patterns, or others) and show how they contribute to the meaning of the poem.
3. The student will look at DaVinci's "Last Supper" and describe the nature and the importance of the geometric composition of the painting.

EXERCISE 4

Write an objective at the analysis level for your own discipline here:

_____

_____

_____

_____

Take a moment to discuss it with a neighbor. When you reach agreement that your objective is on the analysis level, continue through the packet.

Synthesis

Bloom defines synthesis as "the putting together of elements and parts so as to form ... a pattern or structure not clearly there before" (Handbook I, p. 162). All art is synthesis, as is an invention of any kind. When a composer takes the elements of music and combines them into a pattern that no one else has thought of, he is synthesizing. Shakespeare often used existing works as sources, and he used the same language used by every other educated individual in Renaissance England. His plays are unique because he put these elements together "so as to form ... a pattern or structure not clearly there before." Newton, Galileo, and Pasteur were synthesizers; formulating hypotheses is also a form of synthesis. Synthesis involves creativity, whether artistic, philosophic, or scientific. We synthesize material to come up with unique (we hope)learning objectives. You ask students to synthesize when you ask them to write an essay describing "My Most Embarrassing Moment."

Here are three examples of learning objectives on the synthesis level:

1. The student will be able to compose an original piece of music in 4:4 time.
2. Given a set of specifications, the student must design a pump for use on an irrigation system.
3. Given all pertinent facts about a city, the student will set up an appropriate mass transit system for that city.

EXERCISE 5

It's your turn again. Write an objective in your discipline in which you ask the student to do something on his own with a set of existing elements.

Discuss this objective with your neighbor before you go on to the next part of the unit.

Evaluation

Evaluation is the highest level of the taxonomy and at the same time one of the easiest to explain and understand because it is also a fundamental element of human nature. We constantly make judgements based on given criteria, whether the criteria are set by ourselves or society. If your criteria for good children are silence and distance and your neighbor's children play noisily under your study window, you will evaluate those children in a negative manner (Little brats!). Movie critics set up criteria (by no means uniform) for excellence in movies and evaluate each movie according to those criteria. You will be asked to evaluate this packet. When you develop learning objectives on this level, you are asking your students to consider every scrap of information they have about a subject and make a judgement based on that information. In addition, they have to use specific criteria to make that judgment. They will have to use other levels of the taxonomy when they evaluate. They may recall facts (knowledge); they may translate from one medium to another, as in describing a dance movement verbally (comprehension); they may apply the elements they know to a new situation by choosing an example of expressionistic painting from a group of paintings of various sytles which they have never seen (application). They will certainly synthesize if they write an essay. The following are three examples of learning objectives on the evaluation level:

1. Given a piece of doggerel verse (possibly of your own composition) and a number of lines from Wordworth's "Ode on Intimations of Immortality," the student will select that which he believes is the better poem. He will make his criteria evident and defend his choice.

2. After reading the Equal Rights Amendment, the student will defend or attack its validity, making clear what he means by ambiguous terms such as "rights" and "individual freedom."
3. Given a list of six possible solutions to the problem of overpopulation, the student will select the three which he believes to be the most desirable and defend his choices.

EXERCISE 6

Now you write a behavioral objective on the evaluation level.

_____

_____

_____

_____

Let your neighbor evaluate your objective. He must defend his judgment and tell you his criteria for making that judgment.

V. LEARNING ACTIVITIES

1. Complete the exercises in Combining the Cognitive Domain and Behavioral Objectives.
2. Choose a limited topic in your discipline. If you teach chemistry, you might choose using laboratory equipment or the structure of the atom; if you teach English, you might choose the ballad or the thesis statement. Write an entire set of behavioral objectives--one for each level--on that topic. If there is a level for which you cannot construct an objective, indicate "not applicable" beside it.
3. Review a few of your teaching materials--objectives, test questions, and other materials--and notice whether or not the objectives are behaviorally stated. Then notice the level of the cognitive domain at which the objectives and test questions fall. Note any tendencies toward placing most of your objectives at the lower levels.
4. Write a paragraph stating why it is, or is not, important for a teacher to write objectives at the higher levels of the cognitive domain. What advantages, if any, are there for the student? For the teacher?
5. In a paragraph, evaluate this packet. Make your criteria evident and explain what you mean by ambiguous or judgemental terms (dull, interesting, difficult, ridiculous).
6. Take the Post-Test (Section VI).

VI. POST TEST

1. List the six levels in the cognitive domain in order from the lowest to the highest.
2. Which level is the creative level?
3. Which level involves making a judgment?
4. How is synthesis different from application?

ANSWER KEY

I. Study Questions A and B

These are simply indications of what you should look for in the explanatory sections.

II. Post-Test, Part A

1. A learning objective is a written statement telling what a student is expected to learn from a specific unit of instruction.
2. A behavioral objective is a learning objective that is stated in terms of action, or "doing." It asks for a specific measurable activity (behavior) rather than "knowledge" or "understanding," which are incapable of being measured.
3. Bloom's Taxonomy is a classification, or a hierarchy, of educational goals and student behaviors.
4. The three domains are:
   a. The cognitive domain, which emphasizes recall and application of material.
   b. The affective domain, which emphasizes emotion and responses.
   c. The psychomotor domain, which emphasizes action or motor skill.

III. Post-Test, Part B

1. The six levels of the cognitive domain are knowledge, comprehension, application, analysis, synthesis, and evaluation.
2. Synthesis.
3. Evaluation.
4. Application involves using previously gained knowledge in a different situation which is presented to the learner. If I use a method to

divide 1/4 by 1/8, I can use the same basic method to divide 3/4 by 1/2. Synthesis involves creativity--doing something unique with a set of facts, materials, or specifications. Both Sandburg and Whitman wrote about Lincoln, but their handling (synthesis) of the material reflects the unique genius of each.

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